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(Reaffirmed 2019)

स्वचल वाहन — तेल और वायु की सहायता वाले दाब गेज — विशिष्टि

(पहला पुनरीक्षण)

Automotive Vehicles — Oil and Air Assisted Pressure Gauges — Specification

(First Revision)

ICS 43.040.30

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Automotive Electrical Equipments and Instruments Sectional Committee, TED 11

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Electrical Equipments and Instruments Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was first published in 1988. In this revision besides other changes temperature resistance test, proof pressure test, burst pressure test and vibration at operating condition test have been included.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AUTOMOTIVE VEHICLES — OIL AND AIR ASSISTED PRESSURE GAUGES — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies the general requirements for oil and air assisted pressure gauges (Bourdon type) mechanical individual gauge systems used in automotive vehicles.

2 REFERENCES

The following standards contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No.	*Title*
2500 (Part 1) : 2000	Sampling inspection procedures : Part 1 Attributes sampling plans indexed by acceptable quality level (AQL) for lot by lot inspection (*third revision*)
9000	Basic environmental testing procedures for electronic and electrical items
(Part 5/Sec 2) : 1981	Damp heat (Cyclic) test, Section 2 12 + 12 h cycle
(Part 7/Sec 1) : 1979	Impact test, Section 1 Shock
(Part 7/Sec 2) : 1979	Impact test, Section 2 Bump
(Part 7/Sec 3) : 1979	Impact test, Section 3 Drop and topple
(Part 11) : 1983	Salt mist test
(Part 12) : 1981	Dust test
(Part 14/Sec 2): 1988	Test N : Change of temperature, Section 2 Test Nb : Change of temperature (temperature cycling) with specified rate of change — One chamber method
10250 : 1982	Severities for environmental tests for automotive electrical equipment

3 TERMINOLOGY

For the purpose of this standard the following definitions shall apply.

3.1 Pressure Gauge — An instrument for giving a visual indication by means of a pointer relative to a scale of the amount by which the pressure of a medium applied to it exceeds the pressure of the surrounding atmosphere.

3.2 Bourdon Tube — A pressure responsive element in the form of a curved tube which changes its curvature with the change in the internal pressure.

3.3 Case — The outer casing which contains the pressure responsive element and the movement.

3.4 Front Ring — The ring fitted to the case and which holds or retain window to the case.

3.5 Window — The transparent front medium through which the dial is observed.

3.6 Dial — The plate upon which the scale is marked.

3.7 Pointer — The index by the position of which its relation to the scale, the value of measured pressure is indicated.

3.7.1 *Pointer Stop* — Screw, stud or other projection fitted at the beginning and the end of the marking on the scale.

3.8 Shank — That part of the gauge which includes the screwed connection, the spanner flat, the spigot and the inlet orifice.

3.9 Nominal Size — The nominal size of the pressure is the overall diameter of the case.

3.10 Unit of Pressure — It shall be Pascal (Pa) or its multiples (kPa).

NOTE — 101.325 kPa =1 kg/cm^2
1 kgf = 9.806 N

3.11 Flush Mounting Gauges – A gauge intended for mounting in the panel, the greater position of the case being recessed in the panel so that the front of the gauge after mounting is virtually flush with the panel. The gauge is supported by means of a clamp attached to the back of the case and acting against the back of the panel (*see* Fig. 1). Three types of shank and ferrules are shown in Fig. 2.

3.12 Dial Illumination – An arrangement made to the dial and pointer to indicate the readings without the assistance of external light.

4 SIZES AND RANGES

Oil and air pressure gauges used in automotive shall be 52 or 60 mm diameter with a tolerance of $^{+0}_{-0.5}$ mm. The maximum standard for the gauges shall be 0.5, 0.7 and 1.0 MPa or as per agreement between the purchaser and the supplier.

5 CONSTRUCTION DETAILS

5.1 The face of the dial shall be suitably marked with their application, that is 'AIR' or 'OIL' symbolically, as the case may be, and the unit of measurement. The manufacture's monogram shall be as per the agreement between the purchaser and the supplier. These markings shall be of such a size and shall be so located as to not to be obscured at any pointer position.

5.2 The dial scale shall increase from low to high readings in a clockwise direction. A simple number style or colour band shall be used. The letters and markings shall be large enough for easy identification and reading. Number shall be oriented to read in a horizontal 'arcuate' arrangement.

5.3 The pointer shall be of simple, symmetrical shape and shall terminate just short of dial graduations.

5.4 The mounting bracket shall be rigid and capable of withstanding vehicular vibrations without becoming loose.

5.5 All terminals, keys and fasteners shall be robust and shall withstand a torque of 20 kgf for M 5 mounting stud and for M 12 X 1.5 mm shanks it shall be 150 kgf.

6 TESTS

6.1 Acceptance Tests

6.1.1 *Visual Examination*

The pressure gauge shall have good workmanship and shall be free from any visual defects.

6.1.2 *Accuracy Test*

All pressure gauges shall be tested for accuracy over the entire range. The error in pressure indication on any point shall not exceed ±2 percent of the maximum scale value. The response time shall not be more than 1s.

6.2 Type Tests

The following shall constitute type tests:

a) Endurance test (*see* **6.3**);
b) Dry heat test (*see* **6.4**)
c) Damp heat (cyclic) (*see* **6.5**);
d) Cold (*see* **6.6**);
e) Temperature resistance test (*see* **6.7**);
f) Water spray test (*see* **6.8**);
g) Vibration test (*see* **6.9**);
h) Drop test (*see* **6.10**);
j) Dust test (*see* **6.11**);
k) Corrosion resistance (*see* **6.12**);
m) Bump test (*see* **6.13**);
n) Shock test (*see* **6.14**);
p) Solar radiation test (*see* **6.15**);
q) Proof pressure test (*see* **6.16**);
r) Burst pressure test (*see* **6.17**); and
s) Vibration at operating condition (*see* **6.18**).

6.3 Endurance Test

The gauge shall be subjected to cyclic pressure fluctuations for 100 000 cycles at a frequency of 25 ± 5 cycles/min in such a way that the pointer deflects approximately between 0 and 100 percent of the full scale reading. After completion of the above cycles, the accuracy of the reading shall be within ±3 percent of the full scale deflection.

NOTES

1 In case of oil pressure gauge, oil shall be used as a pressure medium and temperature shall be 100 ± 5°C.

2 In case of air pressure gauge , air shall be used as a pressure medium.

6.4 Dry Heat Test

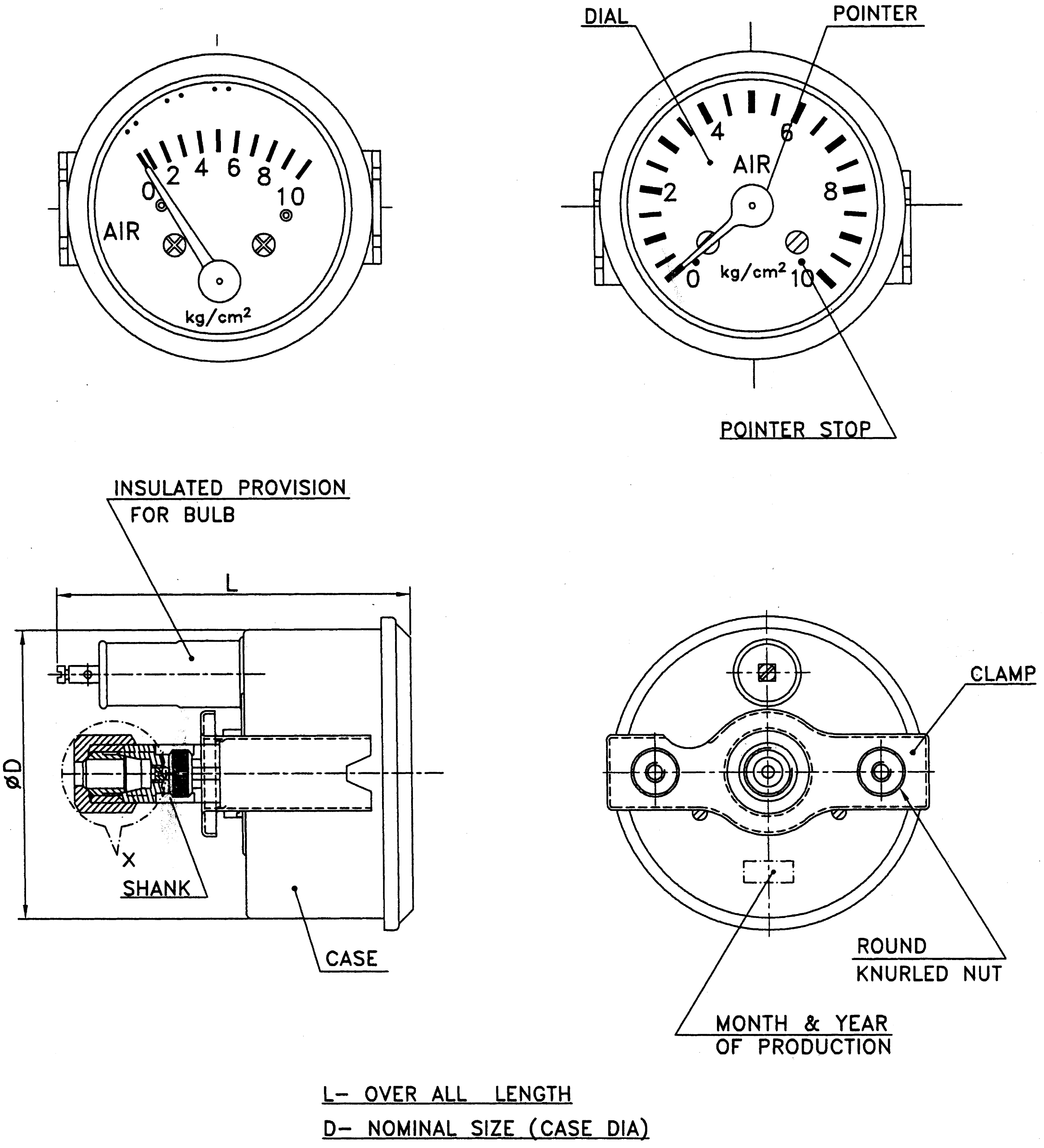
The gauges shall be subjected to a test temperature of 85°C for a period of 4 h with a recovery period of 2 h. When subjected to performance test after the conditioning, the accuracy of the reading shall be within ±3 percent of the full scale deflection.

6.5 Damp Heat (Cyclic) Test

This test shall be carried out in accordance with IS 9000 (Part 5/Sec 2). The number of conditioning cycles shall be two. After completion of the test, the accuracy of the reading shall be within ±3 percent of the full scale deflection.

6.6 Cold Test

The gauge shall be exposed to – 40°C for at least 2 h. The accuracy shall be measured without any recovery time. It shall be within ±3 percent of the full scale reading.



L- OVER ALL LENGTH

D- NOMINAL SIZE (CASE DIA)

FIG. 1 GENERAL CLAMPING ARRANGEMENT

6.7 Temperature Resistance Test

This test shall be carried out in according with IS 9000 (Part 14/Sec 2). After the test, the gauge shall be tested for performance and the accuracy of the reading should be within ±3 percent of the full scale value.

6.8 Water Spray Test

The test shall be conducted for a period of 2 h. The gauge before subjecting to the test shall be mounted in a box facing the dial upwards so as to expose only the front parts. The gauge shall be tested for performance and the accuracy of the reading should be within ±3 percent of the full scale value. There shall not be any ingress of water in the gauge.

6.9 Vibration Test

The test shall be carried in accordance with **4.1** of IS 10250. The test duration in each axis shall be increased to 2 h. After the test, there shall be no damage and the accuracy of the reading should be within ±3 percent of the full scale value.

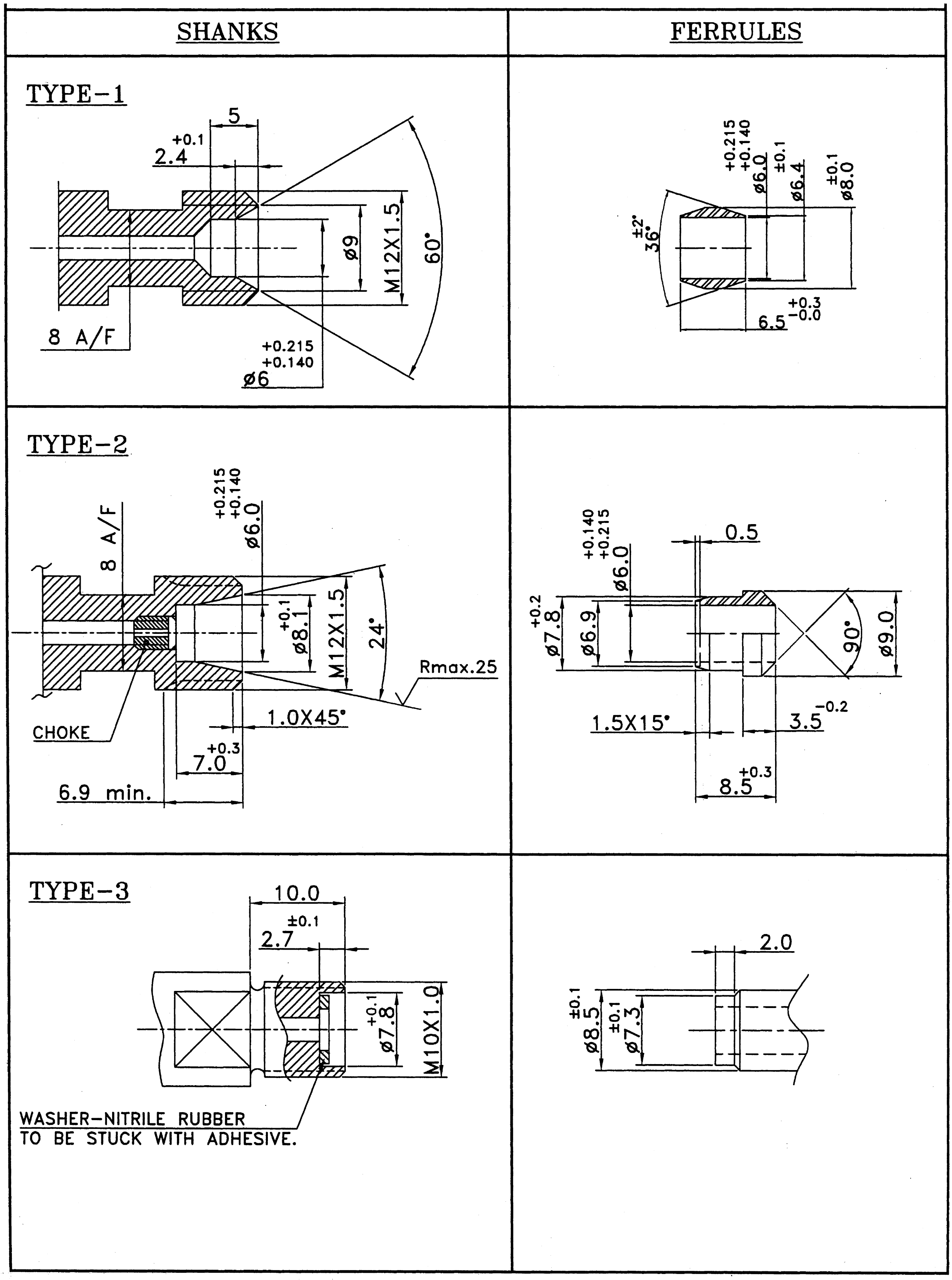


Fig. 2 Types of Shank & Ferrule

6.10 Drop Test

The gauge shall be tested as per IS 9000 (Part 7/Sec 3).

No. of drops : 12
Drop height : 100 mm

After the test, the gauge shall not show any sign of damage. The accuracy of the reading shall be within ±3 percent of the full scale value.

6.11 Dust Test

The gauge shall be tested as per IS 9000 (Part 12) for 5 h and the dust shall be agitated after every 15 min intervals for a period of 2 s. All the opening shall be suitably sealed except in case of dust proof gauge. At the end of the test, the exterior surface is cleaned and subjected to the performance test. The accuracy of the reading shall be within ±3 percent of the full scale deflection, and there shall not be any ingress of dust inside the gauge.

6.12 Corrosion Resistance Test

This test shall be conducted as per IS 9000 (Part 11). The test duration shall be 50 h consisting of two cycles each of 24 h spray and 1 h drain period. After removal from the chamber, the sample shall not show any evidence of corrosion. When tested for accuracy, the reading shall be within ±3 percent of the full scale deflection.

6.13 Bump Test

The test shall be conducted as per IS 9000 (Part 7/ Sec 2). When tested for accuracy, the reading shall be within ±3 percent of the full scale deflection.

6.14 Shock Test

The test shall be conducted as per IS 9000 (Part 7/ Sec1). When tested for accuracy, the reading shall be within ±3 percent of the full scale deflection.

6.15 Solar Radiation Test

When exposed to a period of three months to direct sunlight, the gauge shall not show any visible deterioration.

6.16 Proof Pressure Test

The gauges shall be tested at 130 percent of the maximum scale value for 5 min and number of cycle shall be three. There shall be no leakage and after completion of the test, the accuracy of the reading shall be within ±3 percent of the full scale deflection.

6.17 Burst Pressure Test

The gauges shall show no failure when subjected to 3 times the maximum rated pressure. At the end of the test, there should not be any leakage.

6.18 Vibration at Operating Condition

When the gauge is tested in operating condition with a pressure of 50 ± 5 percent of full scale value, at a frequency of 10-55-10 Hz with sweep time of 1 min for a period of 1 h in each axis, the oscillation of pointer shall not exceed ±5 percent of the full scale value on either side of any particular indication. After the test, the gauge shall not show any sign of damage. The accuracy of the reading shall be within ±3 percent of the full scale value.

7 MARKING

7.1 Each gauge shall be marked with the manufacturer's name/trade-mark, month and year of manufacture, etc. Any other marking as agreed to between the manufacturer and the purchaser may be included.

7.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

7.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standard Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8 PACKING

A suitable protective cap shall be used on the inlet and threaded portion of the gauges. Each gauge shall be packed in carton suitably cushioned to prevent any movement.

9 SAMPLING

Unless otherwise agreed upon, the sampling scheme for testing purposes shall be in accordance with IS 2500 (Part 1).

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Amendments Issued Since Publication

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